WHAT IS CLAIMED IS:

1. An optoelectronic device having a top mirror and a bottom mirror, the top mirror and bottom mirror being at least partially conductive, the improvement comprising:

a resonant reflector positioned adjacent a selected one of the top or bottom mirrors, the resonant reflector having a waveguide and a grating configured such that a first-diffraction order wave vector of the grating substantially matches a propagating mode of the waveguide; and

a cladding or buffer layer positioned between the resonant reflector and the selected top or bottom mirror, the cladding or buffer layer being sufficiently thick, or having a sufficiently low refractive index relative to the refractive index of the waveguide, to substantially prevent energy in the evanescent tail of the guided mode in the waveguide from entering the selected top or bottom mirror.

2. An optoelectronic device according to claim 1, wherein cladding or buffer layer is non-conductive.

3. An optoelectronic device according to claim 1, wherein the cladding or buffer layer and the waveguide each have a refractive index, the refractive index of the cladding or buffer layer being substantially less than the refractive index of the waveguide.

4. An optoelectronic device according to claim 3, wherein the selected top or bottom mirror includes an adjacent layer that is positioned adjacent the cladding or buffer layer, the refractive index of the cladding or buffer layer being less than the refractive index of the adjacent layer.

5. An optoelectronic device according to claim 4, wherein the thickness of

the cladding or buffer layer is thicker than the adjacent layer.

6. An optoelectronic device according to claim 5, wherein the thickness of the cladding or buffer layer depends on the refractive index difference between the cladding or buffer layer and the waveguide.

7. An optoelectronic device according to claim 2, wherein the cladding or buffer layer is a dielectric film.

8. An optoelectronic device according to claim 7, wherein the cladding or buffer layer is an aluminum oxide film.

9. An optoelectronic device according to claim 7, wherein the waveguide region includes AlGaAs.

10. An optoelectronic device according to claim 7, wherein the waveguide region includes a high refractive index dielectric.

11. An optoelectronic device according to claim 7, wherein the grating is a dielectric film.

12. An optoelectronic device according to claim 7, wherein the grating is a silicon oxide film.

13. An optoelectronic device according to claim 7, wherein the cladding or buffer layer functions as part of the resonant reflector.

14. A resonant reflector for an optoelectronic device comprising:

a waveguide; and

a grating film having two or more spaced grating regions separated by one or

more spaced regions, the spaced regions of the grating film having a grating film thickness that is less than the grating film thickness of the grating regions, but greater than the zero.

15. A resonant reflector according to claim 14, wherein selected optical properties of the resonant reflector are controlled by the grating film thickness of the spaced regions and grating regions.

16. A resonant reflector according to claim 15, wherein the spectral bandwidth of the resonant reflector is determined by the grating film thickness of the spaced regions and grating regions.

17. A resonant reflector according to claim 15, wherein each grating region has a lateral width, with the grating regions collectively having a grating period, the grating period minus the grating width defining a grating spacing between adjacent grating regions, the grating spacing divided by the grating period defining a grating fill factor, the grating fill factor being about 50%.

18. A monolithic transceiver having a light emitting device and a light receiving device, comprising:

providing a bottom mirror on a substrate, the bottom mirror being at least partially conductive;

providing an active region on the bottom mirror;

providing a top mirror on the active region, the top mirror being at least partially conductive;

providing a cladding or buffer layer on the top mirror, the cladding or buffer layer being non-conductive;

providing a waveguide on the cladding or buffer layer;

providing a grating layer above the waveguide, the waveguide and grating being configured such that a first-diffraction order wave vector of the grating substantially

matches a propagating mode of the waveguide;

the cladding or buffer layer being sufficiently thick, or having a sufficiently low refractive index relative to the refractive index of the waveguide, such that energy in the evanescent tail of the guided mode in the waveguide is substantially prevented from entering the top mirror; and

the grating layer having a first etched grating structure above the light emitting device.

19. A monolithic transceiver according to claim 18, further comprising a second etched grating structure above the light receiving device.

20. A monolithic transceiver according to claim 18, wherein the grating layer does not have an etched grating structure above the light receiving device.

21. A monolithic transceiver according to claim 18, wherein the grating layer is removed above the light receiving device.

22. A device comprising:

a first substrate having a front side and a back side with at least part of an optoelectronic device formed on the front side;

a second substrate having a front side and a back side with a resonant reflector formed on the front side; and

the front side of the first substrate bonded to the front side of the second substrate.

23. A device according to claim 22, wherein the resonant reflector includes a waveguide and a grating.

24. A device according to claim 23, wherein the grating is positioned more toward the front side of the second substrate than is the waveguide.

25. A device according to claim 23, wherein the waveguide is positioned more toward the front side of the second substrate than is the grating.

26. A device according to claim 22, wherein the front side of the first substrate is bonded to the front side of the second substrate via an optical epoxy.

27. A device according to claim 26, wherein the optical epoxy is non-conductive.

28. A device according to claim 27, wherein the waveguide and grating are configured such that a first-diffraction order wave vector of the grating substantially matches a propagating mode of the waveguide.

29. A device according to claim 28, wherein the optical epoxy is sufficiently thick, or has a sufficiently low refractive index relative to the refractive index of the waveguide, to substantially prevent energy in the evanescent tail of the guided mode in the waveguide from entering the first substrate.

30. A device according to claim 22, further comprising a collimating microlens positioned on the back side of the second substrate.

31. A device according to claim 30, wherein the collimating microlens is in registration with the resonant reflector and the optoelectronic device.

32. A method for forming an optoelectronic device, comprising:

providing a bottom mirror on a substrate, the bottom mirror being at least partially conductive;

providing an active region above the bottom mirror;

providing a top mirror above the active region, the top mirror being at least partially conductive;

providing a cladding or buffer layer above the top mirror, the cladding or buffer layer being non-conductive; and

providing a waveguide and a grating above the cladding or buffer layer, the waveguide and grating configured such that a first-diffraction order wave vector of the grating substantially matches a propagating mode of the waveguide; and

the cladding or buffer layer being sufficiently thick, or having a sufficiently low refractive index relative to the refractive index of the waveguide, to substantially prevent energy in the evanescent tail of the guided mode in the waveguide from entering the top mirror.

33. A method according to claim 32, wherein the refractive index of the waveguide is higher than the average refractive index of the grating.

34. A method according to claim 33 wherein the waveguide includes a first dielectric and the cladding or buffer layer includes a second dielectric layer, wherein the first dielectric has a higher refractive index than the second dielectric.

35. A method according to claim 32, wherein the cladding or buffer layer is initially AlGaAs, which is then oxidized to AlO.

36. A method according to claim 35, wherein the cladding or buffer layer is laterally oxidized.

37. A method according to claim 32, wherein the waveguide is formed from GaAs.

38. A method according to claim 32, wherein the grating is formed by etching an SiO_2 film into a grating.

39. A method according to claim 32, wherein the top mirror and bottom

mirror are Distributed Bragg Reflector mirrors.

40. A method according to claim 39, wherein the Distributed Bragg Reflector mirrors include alternating layers of AlGaAs and AlAs.

41. A method according to claim 40, wherein a top layer of the top mirror is AlGaAs.

42. A method for forming a resonant reflector for an optoelectronic device comprising:

providing a waveguide;

providing a grating film adjacent the waveguide; and

etching the grating film to form two or more spaced grating regions separated by one or more spaced etched regions, the etched regions extending to a depth that produces a desired optical property for the resonant reflector but not extending all the way through the grating film.

43. A method according to claim 42, wherein the depth of the etched regions is selected to produce a desired bandwidth for the resonant reflector.

44. A method according to claim 42, wherein the two or more spaced grating regions have a grating period, the grating period selected to produce a desired resonant wavelength for the resonant reflector.